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THE R. R. I. PLANTERS' BULLETIN

THE RUBBER RESEARCH INSTITUTE

View of the main building and Administration Offices in Ampang Road, Kuala Lumpur.

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THE RUBBER RESEARCH INSTITUTE OF MALAYA

The Institute Laboratories and Administration Office are at the 3rd mile, Ampang Road, Kuala Lumpur
Address for letters and parcels: Post Office Box 150, Kuala Lumpur
Address for telegrams: Searching, Kuala Lumpur
Telephone: Kuala Lumpur 3351/2/3.

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The Institute is open from **8 a.m.** to **1 p.m.** and **2 p.m.** to **4 p.m.** on Mondays to Fridays, and from **8 a.m.** to **12.30 p.m.** on Saturdays.

As members of the senior research and advisory staff are frequently away on visits to plantations visitors who wish to arrange personal interviews are advised to make appointments by letter or telephone.

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Visitors to the R.R.I. Experiment Station and Factory are requested to come on either **Mondays** or **Wednesdays**, arriving at 9.30 a.m.

The Experiment Station is 16 miles from Kuala Lumpur, near the village of Sungei Buloh on the Kuala Lumpur-Kepong-Kuala Selangor road. There is a Guest House on the Station, for the convenience of visitors who desire refreshments or who may wish to stay overnight.

Intending visitors are requested to write to the Director, Rubber Research Institute of Malaya, to arrange dates.

FURTHER ADVICE

Information published in this Bulletin is usually presented in general terms.

Enquiries from rubber producers in the Federation of Malaya, the Colonies of Singapopre and North Borneo, and the territories of Sarawak, Brunei and Nigeria who may require more detailed information specially applicable to their own problems are invited to write to the Institute for it. (See note below on direction of enquires).

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Occasionally parcels arrive at the Institute without any indication of the name of the sender. It is requested that senders will write their names and addresses on the outside of all parcels, and also advise the Institute by letter or telegram of the despatch of parcels. This is especially necessary for perishable material, such as latex samples, plant specimens and the like.

Please see inside of back cover for further notes.

THE R. R. I.
PLANTERS' BULLETIN

(New Series)

Issued by The Rubber Research Institute of Malaya.

Kuala Lumpur, Malaya. 1952. New Series No. I

EDITORIAL

Many Planters will remember the R.R.I. 'Planters Bulletin' published from February 1939 to November 1941, when the last number, No. 18, was issued.

We propose with this issue to resume publication of the Bulletin in much the same form as before the war and at intervals of approximately two months.

For the benefit of new readers we recount the circumstances which indicated that a publication of this kind was considered to be useful in 1939. In our opinion the need for the Planters' Bulletin is no less in 1952.

Our official reports are necessarily lengthy documents, and much of the matter contained in them is recorded in technical language, or in the form of figures and tables. Our Communications published from time to time, and which make up the successive volumes of the R.R.I. Journal, are research reports, and are usually written in formal style employing the technical and scientific terms necessary for such publications. While an attempt is made to reduce the use of technical terms to the necessary minimum, nevertheless both publications may make difficult and perhaps tedious reading for the layman.

It seems advisable under these circumstances to issue a more readable publication, of a lighter nature, presenting topics of current interest and discussing the progress made in the course of research investigations in a style that avoids the use of technical and scientific terms not generally used in plantation practice. This publication is the Planters' Bulletin which we propose to continue publishing at appropriate intervals, as and when suitable material becomes available.

The nature of the articles to be published in future will be of the kind appearing in the present number. Although the present

articles are mainly of botanical interest, future issues will contain notes from other Divisions of the Institute.

From time to time Advisory Leaflets and Memoranda, which have only a limited circulation, are issued by the Institute. It is our intention to revise a number of these leaflets and R.R.I. Circulars for publication in the Bulletin to make them generally available for reference. Summaries of the subject matter of all future R.R.I. Journal Communications will also be published.

At a later date we shall also include references to published reports of work originating from other Rubber Research Institutions in Ceylon, Indo-China, Indonesia, Africa and Tropical America that may be of interest to rubber producers in Malaya.

In this first issue we include notes on the activities of the staff at present working at the R.R.I. The Institute is the servant of the rubber industry of Malaya and of other British rubber producing territories, therefore it seems obvious that personal contact between planters and members of the Institute staff is essential in the interest of the efficiency of the services the Institute can render to the Industry. It is hoped that this Bulletin as a practical and more informal publication, will aid this purpose.

We would therefore, welcome constructive ideas and suggestions from readers in order that the usefulness of the Bulletin may be steadily developed. Moreover, if any reader has any original ideas he considers suitable for presentation to the planting public, the editor will be pleased to consider them for publication, provided that space allows and that the contributions are in keeping with the purpose of the Bulletin.

To sum up, the aims of the Bulletin are the same as they were in 1939, "To give the rubber planter, at suitable intervals and in concise form, information regarding the practical aspects of work carried out by the R. R. I., and by others; that is to say, the way in which the results of such work may be used by him to the benefit of his estate or holding".

EDITOR.

Kuala Lumpur, May, 1952.

POISONING RUBBER TREES WITH SODIUM ARSENITE

Introduction In the first series of issues of "The Planters' Bulletin" (Nos. 5, 11, 12 and 13) and in R.R.I. Circulars Nos. 23 and 29, methods of poisoning rubber trees with sodium arsenite have been described and discussed. Recent experimental work has led to further developments and modification of former recommendations. In this article reference will be made to the most recent experiments and the conclusions to be drawn from them.

Methods of Poisoning Before, and immediately after, the war the method advised for poisoning trees was to cut a horizontal frill, one or two inches deep, girdling the trunk, and to pour in a solution of sodium arsenite in sufficient quantity to give an average dose of about ½ lb. of the arsenite per tree. Work at the Institute and on estates, however, was carried out using other methods in the hope of effecting a reduction in the amount of poison necessary and to develop cheaper, easier and safer methods of application. Among the procedures tested were: spraying the trunk with solutions of sodium arsenite of concentrations of 1 to 50 per cent; spraying or painting similar solutions on to tapped or slaughter-tapped panels; applying crystals of the poison to the tree in auger holes, notches or frills; and painting a poison solution or poison paste on to a ring-barked portion of the trunk. Only the latter method proved to be practicable; success in killing the trees was obtained with some of the other techniques but they were either unreliable in action or too expensive in materials and labour.

Ring-barking the trunk and immediately painting the exposed wood (cambium) surface with a thin paste of sodium arsenite and tapioca starch is both cheap and satisfactory, and experiments have been carried out to determine the best strength of solution, dosage of sodium arsenite per tree, width of ring-bark and best time of year for the operation.

Poisoning of Trees Growing on Coastal Soils The opinion generally held by planters that it is more difficult to poison trees growing on coastal or high water-table soils than on hilly inland soils was confirmed by experiment. The average dose of sodium arsenite required to kill old seedling trees of 50 to 60 inches girth on a coastal soil was found to be over 2 oz. per tree; for trees slightly smaller on an inland soil 1.5 oz. per tree gave a complete kill. On the coastal soil the dose varied with the season; just before "wintering" a dose of 2.2 oz. was required to give a satisfactory kill; in May, during wet weather, and with trees in full leaf the dose required was 2 oz. and in mid-August during hot dry weather a dose of 1.5 oz. was quite effective. Seasonal effects were not investigated in the experiment on the inland estate; all treatments were carried out in May.

Leaf-fall after poisoning took rather longer on the coast land than on the inland soil; a few trees shed their leaves within one to three weeks from poisoning; the remainder took four to six months. On the inland soils the majority of trees shed their leaves in three months, though a small number took up to six months to become bare.

Technique of poisoning The width of the ring of bark removed has an effect on the efficiency of the poisoning: for any given dose of poison, the wider the ring the better the kill. The wider the ring, however, the greater the cost of labour and material; a ring of 8 inches gives a satisfactory kill and is considered a reasonable compromise. Narrower rings definitely reduce the effectiveness of the method.

The strength of the poison solution may not be very important; it is the dose of sodium arsenite per tree that matters.

A thin paste containing 10 lb. of sodium arsenite and 6 oz. tapioca starch to a gallon of water has proved, in practice, to be very suitable for poisoning trees on coastal soils. The solution so made up occupies a volume of about 1 1/3 gallons: for a dose of 2 oz. sodium arsenite per tree about 60 trees should be treated from 1 gallon of the mixture.

If 5 lb. of sodium arsenite are dissolved in a gallon of water the solution has a volume of about 9 pints.

For a dose of 2 oz. sodium arsenite per tree one gallon of this solution should treat 35 trees; for a dose of 1.5 oz. per tree a gallon should treat 46-47 trees.

In practice, for old seedling rubber of average girth of up to 60 inches, calculation of quantities may be simplified by allowing 50 trees per gallon of solution, the solution containing 10 lb. sodium arsenite and 6 oz. tapioca starch to a gallon of water for coastal or high water table soils, and 5 lb. sodium arsenite and 6 oz. tapioca starch for inland soils.

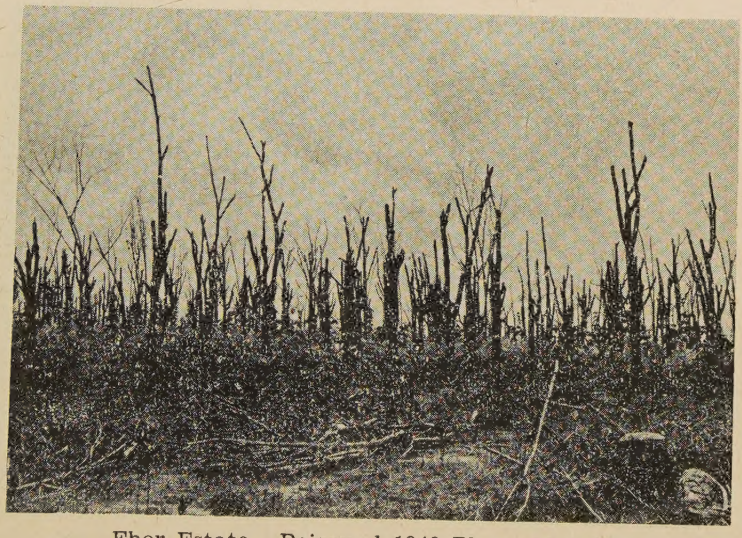
It is essential that the poison be applied **immediately** after ring-barking. Delay leads to drying out of the cut or to partial covering of the surface by coagulated latex. Although poisoning is sometimes effective when the sodium arsenite is applied a day or so after ringing, delay, even of a much shorter time, is a frequent cause of failure.

The poison acts in the following way; it is carried to the leaves in the transpiration stream of the plant. Exposing the wood by ring-barking bares its outer surface to the drying influence of the atmosphere and allows air to enter the water-conducting wood vessels. Once this has happened uptake of any liquid applied to the suface is slow, or may not take place at all, hence the need to apply the poison to the **freshly exposed wood surface.**

Effects of Poisoning Visual examination and chemical analysis indicate that the poison travels rapidly upwards, through the outer millimetre or two of the wood tissues, to the leaves, killing the all-important cambium on its way. Only a relatively small proportion of the poison travels downwards. It is because poison movement is in the outermost layers of the wood that the ring-barking technique is so effective; the poison is applied to a relatively large area of the woody tissues in which the upward flow of water is at its most vigorous.

In this connection it may be noted that full-circumference slaughter tapping to the wood before poisoning, at a level above that at which the tree will be ring-barked and poisoned, may lead to

Ebor Estate. Poisoned 1948 Photo 26-6-51



Ebor Estate. Poisoned 1949 Photo 26-6-51

Trees poisoned with sodium arsenite

Ebor Estate. Poisoned 1950 Photo 26-6-51

Sungei Rinching Estate. Poisoned Oct. 1949 Photo Jany. 1951

Trees poisoned with sodium arsenite

Midlands Estate. Poisoned Oct. 1948 Photo 26-6-51

Midlands Estate. Poisoned Oct. 1949 Photo 26-6-51

Trees poisoned with sodium arsenite

failure to obtain a kill, through the drying out of the wood so exposed, which thus loses its power of transporting water. This is not necessarily the general rule, but such cases have been observed.

If for any reason poisoning fails, re-poisoning is possible, but **it must be done in living tissues above the former ring.**

A question of some interest is whether poisoning by the ring-barking method assists in any way in killing the roots of the trees so treated. Observations are being made; at present the results are inconclusive, but so far there seems to be little evidence that death of the roots as a whole will be materially hastened compared with stumps of felled trees. Poisoning by frill-girdling seems to be slightly more effective in killing the stumps, but evidence on this too is not at all convincing.

When trees have been killed by sodium arsenite the heavy branches start falling 6—8 months after the leaves are shed, and continue for about 9 months, though behaviour of trees in this respect may vary considerably. Trunks may stand for two or three years after poisoning, while some fall heavily, and others may come down in fragments. As far as we know at present, doses of poison larger than the minimum necessary to kill a tree do not as a rule shorten the interval between leaf-fall and branch-fall.

Damage to Young Stand Poisoning is usually done about the time of, or just before planting; this seems a very reasonable practice. Some damage to the young stand by falling branches is inevitable and an increase in initial density of from 10 to 15 per cent is recommended to offset this. Data are being collected on the extent of damage being caused in this manner. Observations from early experiments have shown the following:

(a) Of buddings made in the field 18 months after poisoning the old stand, in the first year of growth less than 2 per cent were completely lost and 6 per cent suffered some damage. The other 92 per cent were completely unharmed.

(b) Buddings planted as budded stumps at the time of poisoning, in two years suffered complete loss of 9 per cent while another 40 per cent suffered some damage but the majority were recovering.

(c) Seedlings grown from basket plants planted in the field at the time of poisoning, in two years lost about 4 per cent completely, while 7 per cent were severely damaged but might recover. In addition 26 per cent were less severely damaged but were recovering.

Damage falls into three categories:

(i) Buddings may be broken off at the union. This happened in remarkably few of the cases investigated.

(ii) Plants may be snapped off at some point of the stem: in one area examined it was estimated that as many as 20 per cent of the plants had been damaged in this way.

(iii) The bark may be scraped off by falling branches. This is frequent and in severe cases could result in a useless panel on the mature tree.

Clearly, budding in the field 12 to 18 months after poisoning, after most of the branch fall (but still among standing trunks) is the way to avoid severe damage to the new stand; on the other hand even budded stumps, the material likely to be most vulnerable, did not suffer an excessive amount of loss when planted at the time of poisoning.

Thinning out by Poisoning Trees The poisoning technique has occasionally been used to eliminate trees marked for removal in the process of "thinning-out". Many planters have reported that in this operation they have noticed damage to neighbouring trees; in a few instances the damage has been serious. The usual reason for this is as follows. A certain amount of natural root grafting takes place between neighbouring trees and there is, therefore, always a risk of the poison from a treated tree being drawn through the roots by its neighbour and a number of such cases have been reported when trees were poisoned by the frill-girdling method. Especially great is the risk when the tree poisoned is wintering while neighbouring trees having leaves are able to exert a strong transpiration pull through roots that are grafted with those of its neighbours. The smaller the dose of poison given to the trees to be killed the less is the likelihood of damage to neighbouring trees. The ring-barking method enables a tree to be killed with a much smaller dose of poison than the frill-girdling method and therefore is considered much safer. Trees of 25 inches girth and less can be killed (on inland soils at any rate) with a dose of 1/3 to 1 oz. of sodium arsenite per tree, and a solution containing 2 lb. sodium arsenite and 6 oz. tapioca starch to a gallon of water has proved effective for trees of this size when applied to an 8 inch ring-barked portion of the trunk, at a rate of about 60—80 trees to a gallon of solution. If a stronger dose seems necessary (e.g. on coastal soils) strengths of up to 5 lb. per gallon may be used.

But in the thinning operation using poison it can never be guaranteed that there will be no damage to neighbouring trees, although reducing the dose to a minimum will make the danger relatively slight.

Cost of Poisoning Experimental results and experience on estates show that a daily task of about 60 trees of 50 to 60 inches girth is a reasonable average for a male labourer when following the ring-barking method. At, say, $2.30 per day, the labour cost per tree is about 3.8 cents.

(a) As stated above, the solution made by dissolving 10 lb. sodium arsenite and 6 oz. tapioca starch in 1 gallon of water occupies a volume of about 1 1/3 gallons; 1 gallon of this solution should treat 50 trees and 1 1/3 gallons about 67 trees.

The cost of 1 1/3 gallons of this solution is as follows:—

10 lb. sodium arsenite @ 63 cents per lb. ...	$6.30
6 oz. tapioca starch @ 30 cents per lb. ...	0.12
Total ...	$6.42

Cost per tree for poison	... $6.42 / 67	...	9.6 cts.
Labour (as above)	...	...	3.8
Total cost per tree	...	...	13.4 cts.

(b) In the case of the weaker poison, dissolving 5 lb. of sodium arsenite in 1 gallon of water gives a solution occupying 1 1/6 gallons which should suffice for about 58 trees.

The cost of 1 1/6 gallons of this solution is:—

5 lb. sodium arsenite @ 63 cents per lb.	...	$3.15
6 oz. tapioca starch @ 30 cents per lb.	...	0.12
Total	...	$3.27

Cost per tree for poison	$3.27 / 58	...	5.6 cts.
Labour (as above)	...	...	3.8
Total cost per tree	...	...	9.4 cts.

To these figures must be added the cost of supervision and it is essential that supervision be good not only to prevent failure (slap-dash painting of the poison on the ring and too long an interval between ringing and poisoning are frequent causes of this), but also because **a responsible person must be present when so dangerous a substance as sodium arsenite is being used.** Further charges are incurred later when the debris falling from the trees has to be cleared from the planting rows. On coastal soils the falling debris can cause serious blockage of drains.

Warning The attention of all persons using sodium arsenite is drawn to the rules under the "Poisons (Sodium Arsenite) Ordinance 1949", issued in the Legislative Supplement to the Government Gazette, 7th March, 1949.

A COMPARISON BETWEEN ALTERNATE-DAILY A.B.C. (PERIODIC) and THIRD-DAILY TAPPING SYSTEMS

Introduction During the past year we have received a number of enquiries at the Rubber Research Institute regarding the relative merits of two tapping systems, namely third-daily tapping (S/2.d/3.67%) and alternate-daily ABC tapping (S/2.d/2.P.67%). We have not carried out detailed experiments which would afford a direct comparison between these two systems on old seedling trees, but a number of experiments have been set up to compare each system in turn with alternate-daily continuous tapping on a half-spiral cut (S/2.d/2.100%). We are thus in a position to make an indirect but reasonably valid comparison between the two systems.

Seedling Trees

Experiment	Yield on S/2.d/3. as % of S/2.d/2.	Yield: lb./ac./annum on S/2.d/2.100%
A	83	450
B	80	—
C	84	350
Mean:	82	—

In an extensive survey which we carried out in 1934 it was found that the proportionate loss in crop on changing from the S/2.d/2.100% to the S/2.d/2. (Periodic) 67% system was higher on good-yielding rubber than on low, as shown by the following figures:

Yield on S/2.d/2.100% in lb./acre/annum	'All-over' yield on S/2.d/3.P.67% yield on S/2.d/2.100%			In percent of 3 years combined
	1st year	2nd year	3rd year	
350—400	76	101	117	98
400—450	74	95	103	91
450—500	72	91	95	86
500—550	71	87	89	83
550—600	70	82	83	78
600—650	69	77	79	75
650—700	68	74	75	72
Means	71	87	92	83

The conclusions to be drawn from these figures are that fields which yield less than 500 lb. per acre on S/2.d/2.100% tapping may give about the same yields if tapped S/2.d/3.67% as they would if tapped S/2.d/2.P.67% and that the response to rest is greater in the low-yielding than in higher yielding areas.

We have no direct evidence to show that third-daily tapping on a half-circumference cut (S/2.d/3.67%) gives better results on low-yielding than on high-yielding trees but if the yield on the third-daily system is not relatively better on low-yielding rubber than on high we should expect the third-daily system to give higher yields than the periodic (ABC) system on old unselected seedling areas yielding more than 500 lb. per acre and lower yields on poorer areas yielding less than 500 lb. per acre.

Budded Trees

In tapping experiments on budded trees (Clones Avros. 49, 50, 152, P.B. 25 and S.R. 9) the following results have been obtained.

Clone	Relative yields (1940)		Mean Relative Yields before 1940. No. of years ( )		Relative Tapping Costs (1940)	
	S/2.d/2. 6m/9.	S/2.d/3.	S/2.d/2. 6m/9.	S/2.d/3.	S/2.d/2. 6m/9.	S/2.d/3.
Av. 49	81	84	(4) 76	70	83	80
Av. 50	69	73	(4) 69	65	97	92
Av. 152	67	73	(4) 67	67	99	92
P.B. 25	78	76	(5) 68	68	86	88
S.R. 9	76	89	(3) 72	71	88	75
Mean (All Clones)	74	79	(4) 70	68	91	85

The results show that both systems give about the same yield at first but that continuous third-daily tapping on a half-circumference (S/2.d/3.67%) had given in 1940 slightly higher yields than the S/2.d/2.6m/9.67% system at a lower tapping cost.

Periodic rest has a much smaller effect on young high-yielding budded trees than on old low-yielding seedling trees.

Dry Rubber Content With periodic (ABC) tapping the DRC is very high immediately after a resting period and falls steeply during the first few weeks of tapping. In a field of 21-year-old seedling rubber yielding 520 lb. per acre tapped per annum, DRC was 47% on resumption of tapping after a period of rest, falling to 40% by the 10th day. It remained above 37% from the 14th to the 30th day and thereafer fell gradually to 33%.

A direct comparison of DRC figures between the S/2.d/2.100%, S/2.d/3.67% and S/2.d/2.P.67% systems from a mono-clone block of

P.B. 25 and the mean monthly DRC figures of the three different tapping systems are shown in the table below:

Mean Monthly DRC of Latex Clone P.B. 25.

	S/2.d/2.100% (A.D.)	S/2.d/2.6m/9.67% (A.B.C.)	S/2.d/3.67% (3rd. Daily)
October, 1934 ...	39.9	38.9	41.1
November ...	39.5	39.1	42.8
December ...	38.3	37.9	42.2
January, 1935 ...	40.7	41.4	44.4
February ...	43.1	41.3	46.3
March ...	41.5	39.3	43.0
April ...	39.8	40.8	42.4
May ...	37.6	37.0	40.0
June ...	36.9	36.6	40.5
July ...	36.3	38.7	40.2
August ...	37.6	37.1	41.7
September ...	38.9	38.2	42.7
October ...	41.6	42.4	44.6
November ...	40.6	39.4	43.4
December ...	40.3	39.2	43.4
January, 1936 ...	39.9	41.4	43.3
February ...	40.3	38.8	42.8
March ...	40.9	39.1	43.0
April ...	40.2	39.8	41.9
May ...	38.1	36.7	40.6
June ...	36.9	35.9	39.9
July ...	37.1	38.5	40.1
August ...	38.6	37.2	41.6
Maximum ...	43.1	42.4	46.3
Minimum ...	36.3	35.9	39.9
Mean ...	39.3	38.9	42.3

It is seen that throughout the whole period of nearly two years third-daily system shows a consistently higher DRC than the other two systems.

Comparison of systems We consider that it is sound to recommend the third-daily system in preference to the alternate-daily periodic system when it is desired to obtain normal field latex with a high dry rubber content, this may be particularly important where latex is being processed by concentration. It also reduces factory troubles in normal sheet manufacture.

Third-daily tapping involves the whole of an area instead of two-thirds at any one time as in an alternate-daily periodic system (a.d. A B C), and the cost of supervision is therefore higher. The cost of equipment is also higher in the third-daily system since all trees have to be provided with cups, etc. As against these drawbacks third-daily tapping does away with the need for transfer of cups etc. from

sections which are rested to those which are brought into tapping, and as the whole mature area is kept under constant supervision this may in the long term prove a decided advantage.

Bark consumption on third-daily tapping is slightly higher than on alternate-daily periodic (ABC) systems owing to the fact that the longer interval between tappings results in deeper drying out of the tapping cut and consequently in the removal of a slightly thicker bark shaving to obtain normal flow at tapping.

To sum up, we would say that old, low-yielding rubber areas with poor bark renewal may be expected to derive greater benefit from long periods of complete rest provided by the "A.B.C." alternate-daily periodic system than from the amount of rest allowed for in the third-daily system, and that on young or mature high-yielding trees with ample bark reserves the third-daily system has certain advantages.

A NOTE ON HEVEA SPRUCEANA

Hevea spruceana was probably first collected by a British botanist and explorer, R. Spruce, who lived and worked in Brazil from 1849 to 1864, and after whom the species has been named. It is a member of the rubber tree family, common in the Amazon valley growing along the course of the Amazon river and its tributaries. Its natural habitat is along the banks of the sluggish waters of these streams, which are subject to intermittent flooding and where the trees may have their roots in water for part of the year.

The trees are said to be of poor growth in South America, and they yield small quantities of poor quality latex. The species hybridises freely with **Hevea brasiliensis**, and natural crosses have been reported from many localities along the Amazon. It is believed that on the islands at the mouth of the Amazon, considerable introgressive hybridisation has taken place between **H. brasiliensis** and **H. spruceana** and in consequence the stature of the **H. brasiliensis** trees has been adversely affected. The yield of these trees is low and the rubber obtained from them is well known for its peculiarly weak and adhesive quality.

Description of the species

Hevea spruceana may readily be recognised by the shape of its seeds, which are about twice as long as they are wide resembling somewhat the common Brazil nut in form. The fruit pod is pearshaped and on splitting at maturity, the woody valves of the pod are not shed, and the seeds are not thrown a great distance from the parent tree as is often the case with **Hevea brasiliensis**. These characters are unique for the species **Hevea spruceana** and, when examined on this basis, no confusion can arise between the two species.

Other characters which may serve to distinguish the two species are the larger flowers of **H. spruceana**, which are tinged with red or mauve, and their flowering shoots which are situated at the tips of the branches. The flower-bearing shoots arise laterally in the axils of scales situated at the ends of strong twigs. These scales which are not found in **Hevea brasiliensis** are persistent and may be present long after growth has been resumed. The flowers are fertilised and the fruits mature before the terminal vegetative bud resumes growth. The veins on the undersurface of the leaves are covered with hairs. These characters are clearly shown in the accompanying photographs and diagrams.

The latex is white to yellowish in colour, but the yield on tapping is small and the rubber is often of a consistency reminiscent of bees'-wax, displaying very poor elastic properties.

Introduction to Malaya

H. spruceana in Malaya most probably originates from an introduction into Indonesia during the year 1913. It is known that budwood obtained from these plants has been used by the late Dr. P. J. S. Cramer to establish trees for experimental purposes on a small number of estates in Malaya; mature buddings of one clone of **Hevea spruceana** are established on the R.R.I. Experiment Station.

Inflorescence

Fully-Grown Fruit

Ripe Fruit

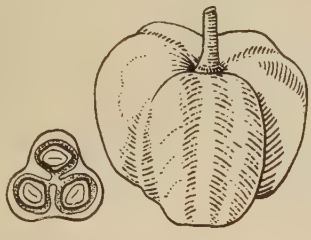
Opened Capsule and Seed

Hevea Spruceana

HEVEA BRASILIENSIS

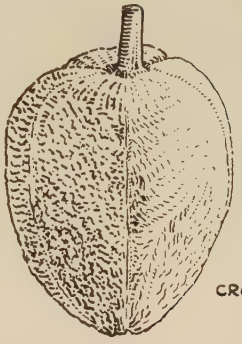
HEVEA SPRUCEANA

FLOWER



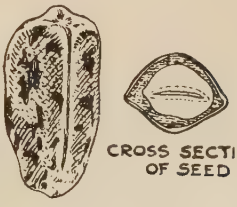
FRUIT

CROSS SECTION OF FRUIT



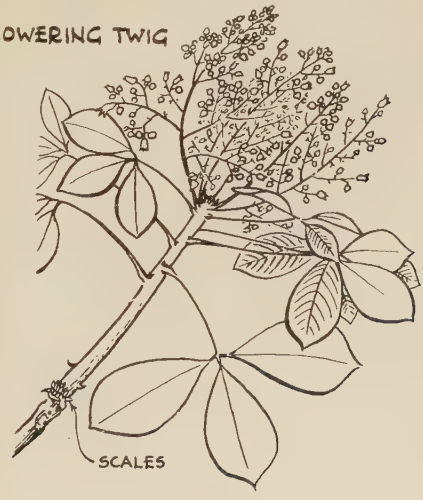
CROSS SECTION OF FRUIT

SEED



CROSS SECTION OF SEED

FLOWERING TWIG



SCALES

The budded trees of this species tend to show a vigorous habit of growth, and to be comparable to normal buddings of **H. brasiliensis** in size and vigour of growth. Since **H. spruceana** has generally been described as lacking in vigour in South America it appeared possible that the material represented on the Experiment Station might not be pure **H. Spruceana**, but its identity has recently been checked and confirmed by Dr. R. D. Rands and Dr. R. E. Schultes, of the United States Department of Agriculture, Division of Rubber Plant Investigations, who compared specimens from the R.R.I. Malaya with herbarium specimens in the U.S.A. The reason for the changed growth habit is not known, but can possibly be attributed to changed environmental conditions.

Yield of Hevea Spruceana

Trees of a single clone of **Hevea spruceana** were budded in two 5-acre isolated plots in the jungle reserve surrounding the R.R.I. Experiment Station in 1932/1933. One plot (A) consists only of buddings of spruceana and the trees in this plot have set very few seeds. The other plot (B) consists of alternate rows of **H. brasiliensis** seedlings and of **H. spruceana** buddings and in this plot **H. spruceana** sets seed freely, clear evidence of ready hybridisation between the two species.

The trees of the **H. spruceana** clone in "Jungle Plot 'B'" (now within R.R.I. Experiment Station boundary) were tapped for a period of five months during 1940 to 1941. The average yield per tapping on a half-spiral alternate-daily system (S/2.d/2.100%) was 50.4 grammes of rubber from approximately 250 trees, **or about 0.2 gramme per tree per tapping.**

In Indonesia unpublished results show that the seedlings of spruceana x brasiliensis hybrids when tapped yielded 2 to 5 grammes per tree per tapping, while normal brasiliensis buddings of average clones yielded 11 to 29 grammes per tree tapping. The yield of the hybrid thus seems to show an improvement over the pure **H. spruceana.**

Hybrid Seedlings for use as Stocks for Grafting

The vigorous growth of the hybrid trees has suggested their possible practical value for use as stocks for budding with brasiliensis clones and the results of an experiment set up in 1931 by the late Dr. Schmole in Sumatra with seedling stocks of the spruceana and brasiliensis cross, obtained from a mixed planting of the two species, have been published in *Archief v.d. Rubbercultuur* Vol. 22 No. 3 p. 178.

Clones AVROS. 49, 50 and 256 were used as scions and the results suggested that for the first 5 years of tapping the effect of the hybrid stocks had resulted in a substantial increase in the yield, girth, bark thickness and rate of bark renewal of the scions. In Schmole's experiment there were originally only 12 plants of each clone on **H. spruceana** stocks and the same number on **H. brasiliensis** stocks. Unfortunately the non-statistical design used in the trial does not allow for an estimate of experimental error by which the results can be accurately assessed.

The value of the **H. spruceana** hybrids as stocks for budding has been investigated in a statistically-designed experiment set up on the R.R.I Experiment Station in October, 1941. Three clones, Pil. B. 84, Tj. 1 and P.B. 86, were used as scions budded upon a number (9) of families of seedling stock of different origin, including hybrid seed of **H. spruceana** and illegitimate seed of clone Pil. B. 84, Avros. 163, Tj. 1 and P.B. 86. Analysis of the results obtained over a period of tapping on the first panel (August, 1948 to June, 1950) showed that from the point of view of yield of the scion the **H. spruceana** hybrid seedlings made the poorest stocks, illegitimate seedlings of Pil. B. 84 and AVROS 163 proving to be the best stocks, the differences being very highly significant. In addition, the buddings made on seedlings of AVROS 163 and Pil. B. 84 had an average girth of about one inch greater than buddings of the same clones budded on the **H. spruceana** hybrid seedlings.

Schmole's early results on small groups of trees are thus not borne out by the R.R.I. results, although it is difficult to assess the reliability of two such widely differing experiments. A further experiment has now been set up on the R.R.I. Experiment Station on imperfectly drained land, to see if spruceana stocks offer any advantage over brasiliensis stocks under these conditions.

Quality of Rubber from H. Spruceana

With reference to the quality of the rubber obtained from **H. spruceana** the preliminary tappings of newly opened trees in 1940 showed that the rubber has a high acetone extract and thus contains a large proportion of resin-like materials. It was also found that considerable day-to-day variation occurred, the acetone extract varying from 10 to 50% of the total rubber. When the trees had been in continuous tapping for some time, however, the acetone extract fell to 2.8%, a value comparable with that of **H. brasiliensis** rubber, but the yield remained low.

Conclusions for Practice

It is concluded that **Hevea spruceana** has no characters to recommend its use for planting. Both the pure species and its hybrids with **H. brasiliensis** yield a very small amount of rubber, and the rubber of the pure species, at least in the early stages of tapping, is of no commercial value. In fact it seems likely that any admixture of spruceana "blood" in our Malayan races of **Hevea brasiliensis** might be quite objectionable, and could result in the development of impurities in our material that could only have a bad effect on rubber quality and properties.

The vigour of the hybrid seedlings led to the investigation of an idea that they would prove to be valuable stocks for budding but this is not so far borne out by the results of the R.R.I. experiments.

Moreover, as **H. spruceana** crosses readily with **H. brasiliensis**, and as the hybrid trees (which may be indistinguishable in appearance from those of pure **H. brasiliensis**) are of no value as yielders, seeds collected from areas containing spruceana progeny may well constitute a danger to the established **H. brasiliensis** in Malaya if introgressive hybridisation could occur in a similar way to that already existing in parts of the Amazon valley.

A draft Bill was published as Notification No. 3158 in the Sixth Supplement to the Government Gazettes of the Federated Malay States No. 16, Vol. XXXIII of 25th July, 1941. The legislation was enacted as Ordinance No. 54 of 1941 in the Straits Settlements.

The object of this note is to stress the undesirable qualities of **Hevea spruceana** and to ask for the co-operation of all estates in preventing its establishment except for scientific investigations.

The R.R.I., in the general interest of the industry will be willing to make careful investigation of all trees known or suspected to be of Hevea spruceana origin and to advise on their future care, or if necessary their destruction.

NOTE ON CLONE L.C.B. 1320

Historical Clone L.C.B. 1320 originates from Java. It was developed by 's Lands Caoutchouc Bedrijven, the Government Rubber Estates, which in the course of extensive selection work during the years 1925 to 1927 selected 3,764 high-yielding seedling trees on their estates and after further careful observation and record of mother-tree yields made clones from 260 of these trees.

The clones were tested in selection gardens on several L.C.B. estates and L.C.B. 1320 has been found to be the outstanding clone in the collection.

Secondary Characters Growth is stated to be vigorous. The young buddings grow very tall before branching and may form a high, somewhat top-heavy crown consisting of a few long, rather angular main branches. This tendency may be corrected by early pruning treatment. Although the clone is not unduly susceptible to wind damage, it is considered advisable not to plant it in exposed situations.

Bark is rather thick. Renewal is satisfactory but renewed bark may, under certain conditions, be rough or uneven in the early years, when careful tapping may be necessary.

According to the latest planting advice from Java (*De Bergcultures* Vol. 20, No. 23, December 1951) growth and yield remain favourable though the clone is somewhat susceptible to brown-bast.

Clone L.C.B. 1320 is reported to be the most vigorous and highest yielding clone on the Tjiomas Experiment Station of the Proefstation van der C.P.V. in West Java.

Yield

The clone is a "slow starter" but the yields increase to a high level through the second or third years of tapping as shown by the available yield records from experimental plantings in Java (Page 18).

The following yields have been recorded in commercial plantings in Java (*Annual Report of the C.P.V. for 1950*).

Clone	Acreage	Average No. of trees/acre in last tapping year	Average Yield: Lb. dry rubber/acre/annum in year of tapping (post-war period)				
			3	5	6	7	8
L. C. B. 1320	57.1	136	537	—	854	893	1030
P. B. 86	16.4	118	—	709	968	869	615
Tj. 1	136.4	132	346	—	498	524	646

The tapping system is not stated in the report but it may be assumed to be of 67% intensity, which is in general use in Java.

Planting Recommendations The clone is recommended by the Proefstation van der C.P.V. for use on a large scale in all districts of Java and South Sumatra.

In Malaya where experience of the yield performance of the clone is not yet available we recommend it for use on an experimental scale.

Introduction of clone L.C.B. 1320 into Malaya Negotiations for the exchange of promising clones between Malaya and Indonesia, which were interrupted by the War, were resumed in 1949 and an agreement was reached between the Rubber Research Institute of Malaya and the Centrale Proefstation Vereniging of Indonesia for the exchange of clone RRI 501 for clone L.C.B. 1320.

Budwood of clone L.C.B. 1320 was received in Malaya in November 1949 and by the terms of an exchange agreement between the Boards of the two Institutes the Rubber Research Institute of Malaya has been appointed to act as the sole distributing agent in Malaya for the sale of budding material of clone L.C.B. 1320.

Conditions for the Sale of Budwood of Clone L.C.B. 1320 The budwood is sold by the Rubber Research Institute of Malaya at the agreed price of $5/- per yard subject to a sales agreement restricting its use solely on estates of the purchasing Rubber Company and forbidding the export from Malaya or the disposal in Malaya of the budwood, or of multiplications made from it.

The Rubber Research Institute normally undertakes to provide nucleus supplies of the budwood (not less than 5 yards) for the establishment of multiplication nurseries but as a plentiful supply of the budwood in excellent condition is available on the R.R.I. Experiment Station orders for quantities of more than 5 yards and up to 25 yards from any one estate could be fulfilled on application.

CLONE L.C.B. 1320

Yield in lb. Dry Rubber per Tree per Annum at age in Years

Centre	Year of Planting	No. of trees in tapping	Tapping System	5	6	7	8	9	10	11	12	13
Tjipetir	1927	38	19 trees: S/3.26d/52.67% and 19 trees: S/4.26d/52.50%		7.3	15.4	15.9	21.6	24.2	29.3	29.7	31.5
Balong	1927	13	S/3.d/2.67%			3.5	4.4	14.1	12.8	21.2	22.9	20.3
Tjiomas	March 1935 as budded stumps 19½′ × 23′	10 — 13	S/2.d/3.67%: first 3 years S/3.d/3.44%: fourth year S/3.d/2.67%: fifth year	4.9	8.2	*13.0	17.9	†18.1				

* Yields estimated from the yields of 11 months' tapping;
† Yields estimated from the yields of 10 months' tapping.

LIST OF POST-WAR PUBLICATIONS

1. GENERAL REPORTS

1940 (Annual Report)	—	published November, 1947
Jan. 1941—Aug. 1945	—	„ August, 1950
Sept. 1945—Dec. 1948	—	„ October, 1950

2. PLANTING MANUALS

No. 4 (2nd Edition) "Latex Preservation Concentration and Shipment" by J. H. Pidford (March 1947)

No. 9. "R.R.I. Type Smoke-houses" (July 1949)

No. 10 "Socfin Method for "Naked" Baling of Rubber" (August 1951)

3. JOURNAL OF THE RUBBER RESEARCH INSTITUTE OF MALAYA (COMMUNICATIONS)

Vol. 12 Comm. 262—Retention of Phosphates by Malayan Soils, by G. Owen (August 1947)

263—Use of Hydrometers to estimate dry rubber content of Latex, by H. Fairfield Smith (December 1947)

264—The Evaluation of Creaming Agents, by W. S. Davey and K. C. Sekar (December 1947)

265—A Sampling Survey of Tapping on Small Holdings (1939-40), by H. Fairfield Smith (January 1948)

266—Effect of Fertilisers on Growth of Hevea: A Study in Combination of Data from a Heterogeneous Group of Experiments, by H. Fairfield Smith (January 1950)

267—Manuring Experiments on Young Rubber Trees: I. Effect of Fertilisers on Growth, by C. G. Akhurst and G. Owen (March 1950)

268—Centralised Processing of Smallholders' Latex and Rubber. Experiment 1. Kampong Batu Kampar, Kedah, by L. R. Davidson and Mohd. Rouse bin Haji Mohd. Amin (March 1950)

269—Quality and Grading of Natural Rubber (June 1950)

270—The Constituents of Hevea Latex. Part VII. Studies of the Dependence of the Composition of Latex on various Factors operative in the Plantations, by K. C. Roberts (August 1950)

Subject Index to the Journal of the Rubber Research Institute of Malaya Vols. 1—12, 1928—1950 (issued in January 1951)

Vol. 13 Comm. 271—Studies in Hevea Rubbers, Parts I and II, by George F. Bloomfield (January 1951)

272—Studies in Hevea Rubbers, Parts III and IV, by George F. Bloomfield (January 1951)

273—Studies in Hevea Rubbers, Parts V and VI, by George F. Bloomfield (January 1951)

274—A Provisional Classification of Malayan Soils, by G. Owen (July 1951)

275—Progress of Breeding Investigations with Hevea brasiliensis, II by C.C.T. Sharp (December 1951)

276—Latex Symposium (December 1951)

Vol 14 Comm. 277—Report on Technical Classification of Natural Rubber in Malaya (April 1952)

4. **CIRCULARS**

No. 16 (revised) Preparation of a Coagulant from Coconut Toddy (February 1946)

20 Reduction in Tapping Costs by Full-Circumference Tapping (December 1945)

21 Tapioca Water as a Coagulant of Latex (January 1946)

22 Optimum stand per acre in fields of young rubber (September 1946)

23 Poisoning of Rubber Trees with Sodium Arsenite before Replanting (February 1947)

24 Bale Packing of Rubber (July 1947)

25 Budgrafting without Waxed Budding Tape (July 1947)

26 Notes on Hedge Planting of Rubber (July 1947)

27 Methods of Application of Fertilisers (November 1947)

28 Clones of the R.R.I. "500" Series (June 1948)

29 Poisoning of Rubber Trees with Sodium Arsenite (April 1949)
(This supersedes Circ. No. 23 of February 1947)

30 Replanting Fertiliser Programme (May 1950)

31 Note on Backward Replantings (June 1950)

32 Treatment of Wounds (June 1951)

33 Pink Disease (September 1951)

5. **INFORMATION CARDS ISSUED BY THE CHEMICAL DIVISION (1c—8c, revised April 1948)**

No. 1 Useful General Information on Factory Practice

2 Standardizing and Coagulation of Latex

3 Some Estate Chemicals and their Uses

4 Defects in Rubber

5 Defects in Rubber (continued)

6 Manufacture of Pale Crepe

7 Preservation and Testing of Latex

8 Preservation and Testing of Latex (continued)

6. DUPLICATED LEAFLETS AND MEMORANDA

The following papers have been issued on a restricted list only.

Copies may be obtained on application to the Rubber Research Institute.

ADVISORY LEAFLETS

Botanical Division

B/AL. 18—Optimum stand per acre in fields of young rubber
(issued 17th September 1946)
also issued in printed form as Circular No. 22

„ 19—Preliminary Notes on the Large Scale Testing of Clones of the R.R.I. '500' Series
(issued 23rd September 1946)

„ 20—Choice of Planting Material in 1946
(issued 24th September 1946)

„ 21—Instructions for the Final Pruning & Treatment of the Pruned Surface of the "Snags" of Buddings made on Large Stocks
(issued 18th June 1947)

„ 22—The Preparation of Nurseries
(issued July 1947)

„ 23—Suppliers of Clonal Seeds
(issued 1st August 1947)

„ 24—Planting of Clonal Seed
(issued September 1947)

„ 25—"Slaughter" Tapping by Tapping Upwards
(issued September 1947)

„ 26—Instruction for Test-Tapping and Thinning Out
(issued 20th November 1950)

Pathological Division

P/AL. 1—The Control of Root Disease in Young Rubber Areas
(issued 1947; revised 1949)

„ 2—Mouldy Rot
(issued 1948; revised July 1950)

„ 3—Mites—(issue 1948; revised 1952)

„ 4—Treatment of Fire Damage
(issued 1949)

„ 5—Notes on Sulphur Dusting
(issued 1949)

„ 6—Inoculation of Leguminous Cover Crop Seed
(issued 1950)

„ 7—Bird's Eye Spot
(issued 1951)

Chemical Division

C/AL. 1 (48)—R.R.I. Tunnel Smoke-House
(issued 22nd June 1948)

„ 9 (47)—Rubber Packing—Bare-back Bales
(issued 20th June 1946)

Chemical Division—(contd.)

C/AL. 10 (47)—Apparatus required for testing Dry Rubber and Ammonia Content of Latex on Estates (issued 1st February 1947)

„ 11 (48)—Notes on the Preparation of Sole Crepe (issued 25th May 1948)

„ 12 (49)—Shed for Drying Scrap and Lump Rubber (issued 19th October 1949)

„ 13 (50)—Rubber Power—Methods of Preparation (issued 27th February 1950)

„ 14 (51)—The Preparation of Rubber Powder (Mealorub) on Estates, (issued 29th August 1951) (This replaces C/AL. 13)

„ 15 (52)—Notes on Latex Anticoagulants (issued March 1952)

Soils Division

S/AL. 7 (46)—Destruction of Lalang with Arsenical Sprays (issued 26th April 1946) and addenda to: (issued 13th August 1946) **(This leaflet has been replaced by S/AL. 9 (47))**

„ 8 (47)—Instructions for taking soil samples (issued 17th September 1947)

„ 9 (47)—Control of Lalang with Sodium Arsenite (issued 4th November 1947) **(This leaflet replaces S/AL. 7 (46))**

„ 10 (48)—Revised Manuring Schedule for Replanted Rubber (issued February 1948)

„ 11 (51)—Manuring of Nurseries (issued April 1951)

MEMORANDA

Botanical Division

B/M. 33 (47)—Collection and Use of Rubber Seeds for Oil Extraction

„ 36 (48)—Multiple Stem Budding

„ 37 (48)—New Planting of Rubber by a Method of Jungle Clearing by Poison Girdling

„ 41 (49)—List of Budding Contractors

Pathological Division

P/IN. 1 (50)—Water Miscible Tar Acid Fungicides

„ 2 (50)—Preparation of Asphalt-Kerosene Wound Paint

„ 3 (49)—Observations on the Treatment of Mouldy Rot

„ 3 (50)—Preparation of a Bordeaux Mixture

Soils Division

S/M. 27 (51)—Note on Eradication of 'Lalang' by Spraying with Oils

„ 32 (51)—Control of Lalang by Spraying

Chemical Division

C/M. 10 (47)—Packing of Small Bales

„ 16 (48)—Temporary Packing Specifications for Crude Rubber

„ 17 (48)—Packing Raw Rubber

„ 18 (49)—Fees for Examination of Samples

„ 20 (49)—Methods of Determining Total Solids of Content

„ 21 (49)—Methods of Determination of D.R.C.

„ 29 (49)—Simplexometer Chart

„ 30 (49)—Note on New Grades of Plantation Rubber

„ 32 (49)—Methods of Preparing Crumb Rubber

„ 33 (49)—Specified Rubbers

„ 34 (49)—Use of Hydrometers to estimate the rubber content of Latex

„ 43 (49)—Carbon Black Test Mixings

„ 46 (49)—Terminology of Rubber Grading

„ 53 (50)—Measurement of Modulus at the Fixed Elongation

„ 55 (50)—Colour of Crepe from Clonal Latex

„ 59 (50)—Sheeting Batteries available in Malaya

„ 68 (50)—Instructions for taking Samples from Baled Rubber

„ 70 (50)—Procedure adopted by R.R.I. for Sampling, Testing and Grading of Rubber according to Technical properties

„ 78 (50)—A note on crepeing batteries

„ 79 (50)—Preparation of White Latex Crepe

STAFF

Director	—	**C. E. T. Mann**, B.Sc. M.Sc.(Lond) F.I.R.I.
Deputy Director (Acting)	—	**C. C. T. Sharp**, (on leave)
	—	**C. G. Akhurst**, (Head of Soils Division)

RESEARCH and ADVISORY STAFF

SOILS DIVISION

Head of Division. — **C. G. Akhurst**, B.Sc.(Lond), A.R.C.S., A.I.T.C.A.

Research on soils, fertilisers and herbicides. Design and control of large-scale field experiments and general advisory work on all related problems.

Soils Chemist. — **G. Owen**, B.Sc., M.Sc., (Wales).

Research on soils, particularly the role of phosphates in Malayan soils. Plant nutrition, tissue analyses in diagnoses of nutrition problems.

Soils Chemist. — * **W. H. Williams**, M.A., B.Sc. (Aberdeen), D.I.C.

Research on magnesium deficiency in soils on which rubber is grown. Work on weed control by the use of poison spraying. General advisory work.

Soils Chemist. — **G. M. F. Grundy**, B.Sc.(Capetown), B.Sc.(Nott).

General advisory officer and soils chemist. (At present on special course in tropical agriculture at Imperial College of Tropical Agriculture, Trinidad).

BOTANICAL DIVISION

Head of Division. — **E. D. C. Baptist**, B.Sc., M.Sc., Ph.D.(Lond), A.R.C.S., D.I.C. (on leave).

Research in plant physiology. General advisory work on all botanical problems, in breeding, clone selection for planting, tapping and general planting procedures.

Botanist. — **H. M. Burkill**, M.A. (Cantab).
(Acting Head of Division)

Botanist in charge of large-scale field experiments on estates. Field research on development of new types of planting material and collection and trial of new material, and other crops grown or to be grown in association with rubber. General advisory work on planting of new material.

Botanist. — **C. W. Brookson**, B.Sc.(London).

Research on plant breeding and selection, methods of propagation and trial of new material of Hevea.

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* On leave from November 1951. Resigned whilst on leave.

Botanist.	**P. de Jonge**, Agr. Ir. (Wageningen). Research on tapping of Hevea, physiology of latex production, stimulation of yield and related problems.
Plant Physiologist.	**Vacant.** Research on nutrition of the rubber tree and the influence of nutrition on yield and quality of latex and rubber.
Plant Physiologist.	**Vacant.** Research on the physiology of latex formation in the plant and the study of factors that influence the production of rubber and associated substances.
Botanist.	**Special Appointment—Vacant.** To study the family Hevea in the East and in Tropical America, in liaison with other Institutes for Rubber Research in different countries.
Assistant Botanist.	**T. V. Vaidyanathan**, B.Agr.(Bombay). Research assistant to the geneticist and plant breeder. In charge of hand-pollination work on Hevea and general supervision of field trials of new material.
Assistant Botanist.	**V. K. Bhaskaran Nair**, B.Sc.(Travancore), M.Sc. (Bombay). Assistant in charge of general laboratory work, examination of plant specimens, anatomical studies and supervision of the Division botanical collections and herbarium.

PATHOLOGICAL DIVISION

Head of Division.	**R. A. Altson**, B.Sc.(Lond), A.R.C.S. Research on the fungus diseases of rubber, and other plants grown in association with rubber and the investigation of control measures. Study of measures for plant protection with special reference to rubber. General advisory work.
Entomologist.	**A. Newsam**, B.Sc.(Lond), Ph.D.(Lond). Study of insect and other animal pests of rubber and development of control measures for application in the field.
Pathologist (Field).	**F. W. Hutchison**, N.D.A., C.D.A.(Edin). Field research officer. Conduct of field experiments on the study and control of diseases and pests of rubber. Investigation of new materials and methods in co-operation with research officers of the Division. General advisory work.
Pathologist.	**R. Hilton**, B.A. (Cantab). Research on the leaf diseases of Hevea, and of other crops grown with rubber.

Assist. Pathologist.	**K. P. John**, B.A. (Madras). Assistant research and advisory officer. In charge of general laboratory work, examination of plant specimens, collection and maintenance of cultures of fungi that attack rubber.

CHEMICAL DIVISION

Head of Division.	**W. G. Wren**, B.Sc.(Lond), A.R.C.S., D.I.C., A.I.R.I. Research in problems of latex and rubber technology and general direction of the research and advisory work of the Division.
Chemist	**G. W. Drake**, B.Sc.(Oxon), M.A. Research on the chemical and physical properties of latex and rubber with special reference to the rubber hydrocarbon.
Chemist.	**A. S. Cook**, B.Sc., (Glasgow), A.R.I.C. Research on latex and general advisory work on the preparation of concentrated latex and routine preparation of dry rubber.
Chemist.	**Vacant.** For research on the colloidal properties of latex with a view to the development of improved methods of preservation, preparation of latex concentrates and detailed study of the process of latex coagulation.
Bio-Chemist.	**R. H. Smith**, B.Sc.(Lond), Ph.D.(Lond), A.R.C.S., D.I.C. Research on the biochemistry of latex with particular reference to the non-rubber substances in natural latex.
Physicist.	**L. L. Best**, B.Sc.(Lond), M.Sc.(Lond), A.K.C. Research on the physical properties of prepared rubber and the investigation of methods of technical classification of rubber.
Rubber Technologist.	**H. M. Edmondson**, B.Sc.(Lond). Research on the preparation of special rubbers with improved technological properties. Study of new methods of preparation of dry rubber in association or combination with other substances e.g. carbon black, lignin.
Chemical Engineer. *	**Vacant.** Research on factory procedures for the standard preparation of latex concentrates and dry rubber. Development of new factory processes for the manufacture of special products e.g. rubber powder. General advisory work on all current methods of manufacture of latex and dry rubber.

* The Chemical Engineer is normally resident on the Rubber Research Institute Experiment Station at Sungei Buloh and is in charge of operations in the Experiment Station Factory.

Chemical Engineer.	**R. S. Gale**, B.Sc., Eng.(Lond), A.C.G.I., A.M.I.Chem.E.
	Research on the development of improved methods of preparation of latex and dry rubber and the design and construction of new plant and equipment for this purpose.
Chemist.	**J. E. Morris**, B.Sc.(Lond).
	Investigation and development of laboratory analytical methods for the chemical examination and testing of latex and rubber.
	(Now working in U.K., to take up appointment in Malaya in June 1952).
Assistant Chemist.	**K. C. Sekar**, B.A.(Madras), A.I.R.I.
	Research on methods of testing the properties of latex concentrates and assistance to the Head of Division in the organisation and supervision of general laboratory operations.
Assistant Chemist.	**Cheah Sein Liat**, B.Sc.(Bombay).
	Research on determination of certain non-rubber substances in latex and rubber and assistance to senior research officers in supervision of laboratory work.
Assistant Chemist.	**B. C. Sekhar**, B.Sc.(Delhi).
	Research assistant to the senior physical chemist in research on fundamental properties of latex and rubber.

***Seconded Research Officers**

Chemist.	**R. F. J. Freeman**, B.Sc., Ph.D.(Bristol).
(seconded from B.R.P.R.A.)	Studies of changes in the rubber hydrocarbon on storage, with particular reference to size and shape of the molecules.

***Foot Note.**—Certain sections of the programme of research of the Chemical Division, R.R.I., are closely related to work in progress at the laboratories of the British Rubber Producers' Research Association (B.R.P.R.A.) and the London Advisory Committee for Rubber Research (Ceylon and Malaya) in Great Britain. When it becomes evident that an investigation in progress in the U.K. can be continued with advantage in Malaya arrangements are made for the temporary transfer of the officer concerned to continue his work at the R.R.I.

Dr. Freeman, comes to the R.R.I. on secondment from the B.R.P.R.A. to continue his researches on the chemical structure of rubber.

Dr. G. F. Bloomfield, also a senior member of the staff of the B.R.P.R.A., who worked at the R.R.I. from September 1948 to January 1951 returned to the R.R.I. in May to carry out a special investigation in connection with the development of a new process for the manufacture from fresh latex of a specially toughened form of natural rubber for use in the boot and shoe industry.

STATISTICS SECTION

Statistician.	**D. R. Westgarth**, B.Sc.(Dunelm), M.Sc.(Lond), F.S.S. Research on the application of statistical methods to the design and conduct of experiments in the field and the laboratory. In consultation with other research officers undertakes the design of experiments and the analysis of data from investigations undertaken by the Divisions.
Assist. Statistician.	**A. Fong Chu Chai**, Dip Arts. (Raffles College). Analysis of data from experimental work submitted by the Divisions and general assistance to the Statistician.

* SMALLHOLDERS' ADVISORY SERVICE

Senior Smallholders' Advisory Officer.	**L. R. Davidson**, B.Sc.Agric.(Edin). (on leave). Officer in charge of Rubber Instructors for provision of advice and instruction to smallholders on all problems of the cultivation and preparation of rubber.
Smallholders' Advisory Officer.	**J. M. F. Greenwood**, B.Sc.Agric.(Lond). (Acting Senior Smallholders' Advisory Officer). Duties are as above.

R. R. I. EXPERIMENT STATION

Manager.	**R. F. Harley**, A.I.S.P. In general charge of the administration of the R.R.I. Experiment Station, Sungei Buloh, and the conduct of large-scale field experimental work in consultation with research officers of the Institute.
Assistant Manager.	**A. E. Browne.** (on leave).
Assistant.	**J. E. Ellison.**
Assistant.	**G. A. D. Hooper.**

GENERAL ADMINISTRATION

Secretary.	**H. S. Blacklin.** Secretary to the Board and Permanent Committee. In charge of the Institute Accounts and general administration of personnel and related business.
Assistant Secretary.	**J. C. Reeves.** General administration and special assistance to the Director in connection with capital works, housing and related business.

*Foot Note.—The R.R.I. Smallholders Advisory Service works in close co-operation with the Department of Agriculture, employing a staff of about 50 Instructors and 60 Demonstrators who are stationed in all of the principal rubber smallholding areas throughout Malaya. Close contact is maintained with State and Settlement Agricultural Officers who undertake the administrative supervision of Rubber Instructors duties within their respective districts.

NOTICES.

BUDWOOD AVAILABLE AT THE EXPERIMENT STATION

Budwood of the following clones is now available. Clones RRI. 501, RRI. 513, RRI. 526, RRI. 527 and L.C.B. 1320.

These clones are sold subject to an agreement prohibiting resale.

The cost inclusive of packing is $5.00 per yard and orders are accepted for minimum quantities of 5 yards of budwood per clone.

All enquiries should be addressed to

The Manager,

R.R.I. Experiment Station,

Sungei Buloh,

Selangor.

PRE-WAR PUBLICATIONS

The Institute holds limited stocks of many of the R.R.I. publications issued before the Japanese occupation.

Planters now resident in Malaya who may wish to have copies of any pre-war publications are advised to apply for a copy of the list of those available.

Applications should be addressed to the Secretary, Rubber Research Institute of Malaya, P.O. Box 150, Kuala Lumpur.

PROHIBITED PLANT SPECIMENS

The attention of planters and others **in territories outside the Federation of Malaya and the Colony of Singapore** is drawn to the Malayan Plant Importation Rules which prohibit the importation into Malaya of any part of a plant, whether living or dead, unless it is accompanied by a Permit issued by the Director of Agriculture, Federation of Malaya. No permit will be issued in respect of any diseased plant or any plant pest.

Any plant imported in contravention of these Rules (whose object is to prevent the introduction of diseases or pests) will be destroyed without examination.

In view of the above regulations, anyone outside Malaya who desires our advice on pests or diseases or any other matters that may require examination of living material must first submit an enquiry by letter giving the fullest possible description of their problem.

DIRECTION OF CORRESPONDENCE

It is requested that all letters be addressed to the Director, special enquiries may be marked for the attention of a particular Officer, if so desired. (Please refer to the Staff List at the end of this Bulletin).

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